REDUCTION OF TOXICS LOADINGS TO THE NIAGARA RIVER FROM HAZARDOUS WASTE SITES IN THE UNITED STATES:

2008 Annual Status Report

Prepared by the United States Environmental Protection Agency in conjunction with the New York State Department of Environmental Conservation

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Executive Summary

For more than two decades, the Niagara River has been the focus of attention between four environmental agencies in the United States and Canada ("the Four Parties"). On February 4, 1987, the Four Parties signed a Declaration of Intent (DOI) to achieve significant reductions of toxic chemical pollutants in the Niagara River. The DOI outlined the principles and activities to be followed and was combined with a detailed annual work plan which forms the Niagara River Toxics Management Plan (NRTMP). The Four Parties agreed upon a specific list of 18 'priority toxics" targeted for reduction through the NRTMP. A key sub-objective and milestone of the NRTMP DOI was to achieve a 50% reduction of ten specific priority toxics believed to be from significant Niagara River sources by 1996.

In a 1988 study report, 33 hazardous waste site clusters were identified and prioritized in order of potential for toxic pollutant loadings to the Niagara River. The 33 cluster sites were placed into three categories: Category I (sites with loadings greater than 50 lbs/day), Category II (sites with loadings between 1 and 50 lbs/day), and Category III (sites with loadings less than 1 lb/day). The EPA and NYSDEC consolidated the list of 33 cluster sites into a priority list of 26 sites consisting mostly of Category I and II, which were determined to be responsible for ~700 lbs/day of the 18 priority toxic chemical loadings to the Niagara River, and, represented the most significant input of non-point source loadings (99.9%) from the U.S. side of the basin. The complete remediation of these sites became the primary focus of the NRTMP to achieve the common goals of the Four Parties agreement. In December 1996, the Four Parties formally re-affirmed, by Letter of Support, their commitment to continue reductions of priority toxic loadings to the Niagara River. Overall, the NRTMP has met its 50% reduction goal for the ten targeted priority toxics, and some by more than 75% through actions addressing point and non-point sources of toxic contamination. Key actions addressing non-point sources include completing 21 of the total 26 priority hazardous waste sites to date. Water quality monitoring data for the period April 2004 through March 2005 shows annual average concentrations for 6 of the 18 priority toxics (Arsenic, Lead, total chlordane, pp-DDD, octachlorostyrene (OCS), and benzo(a)anthracene (a PAH) are now substantially below the most stringent agency water quality criteria at Fort Erie (FE) and Niagara-on-the-Lake (NOTL).

Today, the commitment to reduce toxic loadings through the NRTMP continues. The Four Parties are now evaluating past achievements and future opportunities that exist to coordinate with other related program initiatives occurring within the basin utilizing available expertise and resources. While the main focus of this report is on the status of the original 26 waste sites, EPA and NYSDEC recognize the future challenges that lie ahead. Further evaluation is needed on the opportunities that exist to continue to reduce toxic contaminant levels from U.S. sources within the Niagara River. To meet this challenge, EPA and NYSDEC are considering additional studies as well as evaluating the role of the NRTMP in the binational collaboration towards addressing Beneficial Use Impairments (BUIs) and Area of Concern (AoC) delisting through the Remedial Action Plan (RAP) process. EPA has placed high priority on this effort by setting a target date to restore all BUIs in the Niagara River by 2014 as part of its overall strategic plan for the Great Lakes AoCs.

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Introduction

THE FOUR PARTIES
U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
ENVIRONMENT CANADA (EC)
NY STATE DEPT OF ENVIRONMENTAL CONSERVATION (DEC)
ONTARIO MINISTRY OF ENVIRONMENT (MOE)

Since 1987, the Niagara River has been the focus of attention for four environmental agencies in the U.S. and Canada, called "The Four Parties". The Four Parties signed a Niagara River Declaration of Intent, pledging cooperation to achieve significant reductions of toxic chemical pollutants in the Niagara River (DOI 1987). The Declaration of Intent and a work plan form the Niagara River Toxics Management Plan (NRTMP).

18 NRTMP PRIORITY TOXIC CHEMICALS

Benz(a)anthracene*	Mirex/PhotoMirex*
Benzo(a)pyrene*	Octachlorostyrene
Benzo(b)fluoranthene*	PCBs*
Benzo(k)fluoranthene*	DDTs
Chlordane	Dioxin*
Chrysene	Tetrachloroethylene*
Dieldrin	Arsenic
Hexachlorobenzene*	Lead
Mercury*	Toxaphene

* - Targeted for 50% load reduction by 1996 from point & non-point Niagara River watershed sources using 1987 as a baseline

Under the NRTMP, the Four Parties identified 18 persistent toxic chemicals as "priority toxics". Actions to reduce the inputs of these priority toxics to the Niagara River have been aimed at point sources and non-point sources. Significant point sources on both sides of the Niagara River have been identified and are being addressed in U.S. and Canadian point source plans. The Four Parties summarize progress in controlling point sources in an annual report, last issued in October 2007 (The Niagara River Secretariat, 2007).

Non-point sources of toxic chemicals to the Niagara River (e.g., leachate from hazardous waste sites, storm water runoff, atmospheric deposition) are more difficult to quantify and control. Given the limited information available about non-point sources, the U.S. has proceeded with its actions based on the assumption that hazardous waste sites are the most significant non-point sources of toxic chemicals to the Niagara River.

In 1988, an EPA study estimated potential toxic pollutant loadings to the Niagara River from all known hazardous waste sites on the U.S. side of the Niagara River (Gradient Corp/Geotrans Inc 1988). The study compiled a list of 70 sites into 33 "cluster sites" largely based on the manner in which data has historically been collected. The study further placed them into three categories based on their potential loadings (in lbs/day) to the Niagara River. Figure 1 shows the locations of these 33 site clusters, as well as several other additional hazardous waste sites.

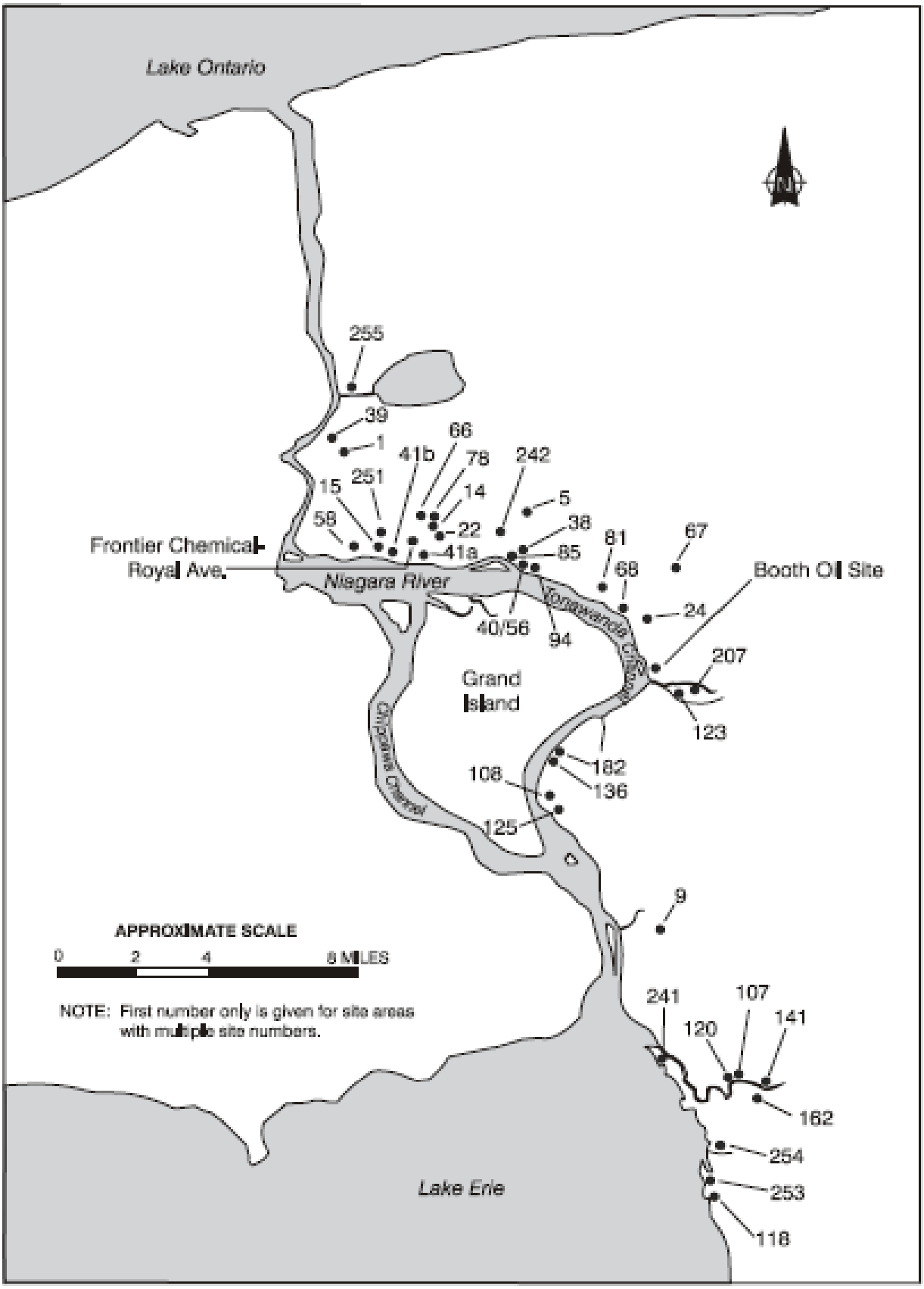

Figure 1. Location of significant Niagara River Waste Sites Addressed by the NRTMP

Figure 1: LEGEND

USGS SITE NUMBERS	SITE NAME
41b-49	Occidental Chemical Corp. (OCC), Buffalo Ave. Avenue
81	Niagara County Refuse Disposal
14	DuPont Necco Park
78a,b	CECOS International/Niagara Recycling
39	OCC, Hyde Park
40,56,85,94[1]	102nd Street
5	Bell Aerospace Textron
66	Durez Corporation, Packard Road Facility (formally OCC, Durez Division)
41a	OCC, S-Area
255	Stauffer Plant (PASNY)
251	Solvent Chemical
1	Vanadium Corp. (formerly SKW Alloys)
58,59,248	Olin, Buffalo Avenue
15-19,250	DuPont, Buffalo Avenue Plant
254	Buffalo Harbor Containment
120-122	Buffalo Color Corporation, including Area D
118	Bethlehem Steel Corporation
136	River Road (INS Equipment)
67	Frontier Chemical, Pendleton
24-37	OCC, Durez, North Tonawanda
253	Small Boat Harbor Containment
68	Gratwick Riverside Park
141	Mobil Oil
162	Alltift Realty
242	Charles Gibson
22	Great Lakes Carbon
182	Niagara Mohawk Cherry Farm
241	Times Beach Containment
108	Tonawanda Coke
107	Allied Chemical
207	Tonawanda Landfill
125-127	Dunlop Tire and Rubber

[1] Occidental 102nd Street site (#40), Olin 102nd Street site (#56), Griffon Park (#85), and Niagara River Belden site (#94)

123	Columbus-McKinnon
38	Love Canal
9-15-141	Iroquois Gas/Westwood Pharmaceutical

The study showed that a total estimated 694 lbs/day (315 kg/day) of toxic chemicals have the potential of migrating from these 33 cluster sites to the Niagara River. Because collection of site-specific transport data is ongoing, estimates were made based on certain assumptions, e.g., that groundwater flow is horizontal, and that pollutants behave in a conservative manner. These assumptions yielded conservative estimates (i.e., estimates of toxic loadings that are expected to be higher than the actual loadings).

Table 1 presents the 33 cluster sites divided into the three categories, based on Gradient/Geotrans 1988 estimates of their potential toxic loads to the Niagara River. The categories are as follows:

Category I:	Sites with loading greater than 50 lb/day
Category II:	Sites with loadings from 1 to 50 lb/day
Category III:	Sites with loadings less than 1 lb/day

Sites from Category I and II collectively represented 99.9% of the total estimated loadings.

In November 1989, EPA and NYSDEC issued a report which prioritized the 33 cluster sites into a list of 26 hazardous waste sites, consisting mostly of Category I and II, which were determined to be responsible for the ~700 lbs/day of the 18 priority toxic chemical loadings to the Niagara River (EPA/NYSDEC 1989). Since 1989, EPA and NYSDEC have reevaluated the universe of hazardous waste sites to identify those that new information shows are significant sources of toxic chemicals to the Niagara River. Two sites have been removed as insignificant sources of toxics, and four sites have been added as significant sources. This update reports on remediation progress at the resulting 26 priority hazardous waste sites.

EPA estimates actual input loading reductions from completed hazardous waste site remedial actions ("RAs") have been from ~700 lbs/day to less than 50 lbs/day; representing an approximate 94% reduction from the 1988 baselines for PCBs, DDT, mirex, octachlorostyrene, chlordane, hexachlorobenzene, benz (a) anthracene, lead and others to the Niagara River. This estimate is based primarily on assuming 100% reduction at sites where the final RA is completed. It does not include the load reductions at other sites where interim remedial controls are in place, e.g., groundwater pump-and-treat systems are functioning at 3 of the 4 sites where remediation is underway and are expected to have already reduced off-site loadings. Since estimates could not be made for these sites with on-going remediation, actual reductions to date may be greater than the estimated 94%. Table 2 identifies the sites where final RAs are complete and the sites where remediation is not yet completed, but which have interim operational remedial systems that are expected to have reduced contaminant loads to the Niagara River.

Final RAs currently underway are expected to be completed at one additional site by the end of 2010 and another site by the end of 2011. Upon completion of these 2 additional RAs, EPA's best estimates are that the estimated toxic chemical inputs from all sites collectively should be

reduced by almost 98% from the 1989 inputs (EPA/NYSDEC 1989).
Other estimates have been made of the potential loadings of the NRTMP priority chemical concentrations in groundwater and groundwater flow to the Niagara River from priority waste sites. These estimates are based on information that was not available when the Gradient/Geotrans estimates were developed. For example, a report by several site PRPs addressing groundwater loadings for ten of the NRTMP priority waste sites estimated priority chemical loadings from ten sites at 5.6 lbs/day (2.5 kg/day) prior to RA, and 0.0048 lbs/day (0.002 kg/day) after RA completion, a reduction of over 99% (CRA 1998). Since these estimates only consider the NRTMP priority chemicals, they are not comparable to the Gradient/Geotrans estimates of total toxic chemical loading. In addition, the report also used some assumptions (i.e. non-conservative assumptions) that would tend to reduce load estimates. Therefore, although actual loadings are likely greater than the estimates, the estimates do corroborate the reduction in toxic chemical loadings to the Niagara River achieved through remedial programs.

In addition to remediation efforts at the waste sites themselves, it is also important to recognize the role of the Niagara Falls Waste Water Treatment Plant (WWTP) in reducing toxic inputs from a number of waste sites to the Niagara River. Based on information available in 1987, the U.S. identified the Falls Street Tunnel, a major unlined industrial sewer cut into the bedrock under the City of Niagara Falls, as the largest source of toxic pollutants from any of its point sources. By the mid-1980s, the Tunnel was only receiving overflows of wastewater from the sewers of a Niagara Falls industrial area, in addition to contaminated groundwater infiltrating from major waste sites via cracks in the Tunnel's bedrock walls. In contrast to flows from other point sources, effluent from the Falls Street Tunnel entered the Niagara River untreated. In 1993, EPA and NYSDEC required the City of Niagara Falls to treat the Falls Street Tunnel discharges during dry weather at the Niagara Falls WWTP. Data gathered by the U.S. indicate that WWTP treatment of the Tunnel's dry weather discharge has reduced mercury loadings by 70% relative to 1980 loads, tetrachloroethylene loadings by 85%, and the loadings of four other priority toxic chemicals by almost 100%.

Since the Falls Street Tunnel captures portions of the upper Lockport bedrock groundwater flow from seven hazardous waste sites, the actions taken to control discharge from the Tunnel reduce loadings from the following sites:

DuPont, Buffalo Avenue
OCC, Buffalo Avenue
Frontier Chemical, Royal Avenue
Durez Division, Packard Road Facility (formally OCC)
Solvent Chemical
CECOS International
DuPont Necco Park

For this report, estimates of site loading reductions do not include those obtained through treatment of the Falls Street Tunnel dry weather flow.

TABLE 1
Gradient/Geotrans Prioritization of Waste Sites According to Potential Toxic Loadings to Niagara River in 1988

Category I: greater than 50 lb/day

Occidental Chemical Corporation (OCC), Buffalo Ave.
Niagara County Refuse Disposal
DuPont Necco Park combined with CECOS International
Occidental Chemical Corporation, Hyde Park

Category II: between 1 - 50 lb/day

Occidental Chemical Corporation, 102nd Street
Bell Aerospace Textron
Durez Corporation, Packard Road Facility (formerly OCC, Durez Division, Niagara Falls)
Occidental Chemical Corporation, S-Area
Stauffer Plant (PASNY)
Solvent Chemical
Vanadium Corp. (formerly SKW Alloys)
Olin, Buffalo Avenue Plant
DuPont, Buffalo Avenue Plant
Buffalo Harbor Containment
Buffalo Color Corporation, including Area D
Bethlehem Steel Corporation
River Road (INS Equipment)
Frontier Chemical, Pendleton
Occidental Chemical Corporation, Durez, North Tonawanda
Small Boat Harbor Containment
Gratwick Riverside Park
Mobil Oil

Category III: less than 1 lb/day

Alltift Realty
Charles Gibson
Great Lakes Carbon
Niagara Mohawk, Cherry Farm
Times Beach Containment
Tonawanda Coke
Allied Chemical
Dunlop Tire and Rubber
Columbus-McKinnon
Love Canal
Tonawanda Landfill

Status of Remediation Progress

Overview
As of the release of this 2008 NRTMP report, final RAs have been completed at 21 of the 26 sites which includes all "Category 1" sites (those with estimated contaminant loads of >50 lbs/day of priority toxic chemicals to the river). It is expected that the post-remedial Operation, Maintenance and Monitoring (OM&M) technology installed at certain sites could be operated, maintained and monitored for continued effectiveness for up to 30 years.

The remaining five sites (Mobil Oil, Frontier Chemical - Royal Ave., Vanadium Corporation, Bethlehem Steel Corporation, and Buffalo Color Corporation Plant Site) have RAs pending or underway. Three of the five sites (Mobil Oil, Vanadium Corporation, and Bethlehem Steel Corporation) are operating interim remedial systems while progressing with completion of their final RAs. Estimated RA completion date for Vanadium Corporation is October 2010 and for Mobil Oil, December 2011. NYSDEC is currently negotiating a Corrective Measures Study (CMS) Consent Order with Tecumseh Redevelopment (current owner of the Bethlehem Steel Corporation site) to complete the remaining projects needed at the site with construction schedules. The other two sites (Frontier Chemical – Royal Ave. and Buffalo Color Corporation Plant Site) have finished Remedial Investigation/Feasibility Studies (RI/FS) for their sites and are expected to start construction of final RAs following approval of their RI/FS by late 2008/2009.

TABLE 2
Summary Status of the 26 Priority Waste Sites

INVESTIGATION AND DESIGN STATUS:

Potentially Responsible Party (PRP) Search
No sites in this phase.

Site Investigation Underway
Frontier Chemical, Royal Avenue[2]
BETHLEHEM STEEL SITE[3]

Remedial Design (RD) Underway
VANADIUM CORP. OU#3[1]

REMEDIAL ACTION STATUS:

Interim Remedy in Place or Under Construction:
MOBIL OIL OU#1 and OU#2
VANADIUM CORP.[1]: OU#2 & OU#3
Frontier Chemical, Royal Avenue[2]
BETHLEHEM STEEL SITE[3]
Buffalo Color Corporation Site

Remediation Completed (OM&M Ongoing)

Stauffer Chemical
Frontier Chemical, Pendleton
Bell Aerospace Textron
CECOS International
Dupont Necco Park
Durez Corporation, Packard Road Facility
OCC, Durez, North Tonawanda
DuPont Plant Site Buffalo Avenue
Olin Plant Site
Buffalo Color, Area D
OCC, Buffalo Avenue
102nd Street (Olin /OCC)
River Road
Niagara Mohawk, Cherry Farm
Niagara County Refuse Disposal
Iroquois Gas-Westwood Pharmacy
Gratwick Riverside Park
OCC S-Area
Solvent Chemical
Booth Oil
OCC-Hyde Park

The sites in interim remediation are also under investigation or design, and therefore are listed twice.

<bold>	Sites in bold have achieved significant progress since the September 2007 report.
<CAPS>	These sites, though not completed, have operational remedial systems that are expected to have reduced contaminant loadings to the Niagara River.

[1] Preliminary investigations were completed. Two Interim Remedial Measure (IRMs) have been completed by PRPs for OU#1 and OU#2. A "No Further Action" Record of Decision was issued for OUs #1 and #2 in March 2006.
[2] The RI/FS for soils and the upper bedrock (OU1) were completed in 2004 with a ROD issued in March 2006. An RI/FS is still required for the deeper bedrock groundwater (OU2).
[3] In 2004 DEC approved an interim corrective measures plan for the remediation of the Benzol Plant Area (i.e., the Coke Oven Area). Recovery-well installation was completed in December 2004. The system includes LNAPL recover and groundwater collection and treatment. The system began operating in April 2005.

Project Highlights

For each individual waste site, status summary tables are provided in Appendix A. Also, detailed site information for all 26 sites can be found in NYSDEC's Environmental Site Remediation Database website located at… http://www.dec.ny.gov/cfmx/extapps/derfoil/index.cfm?pageid=3. Highlights of completed hazardous waste sites with continuing significant work and progress made at the five remaining sites with RAs underway, particularly since the September 2007 NRTMP progress report, are summarized below.

DuPont, Necco Park

- Construction of the Final Remedy began November 2001 with the installation of the additional groundwater wells.

  The following are among the measures included in the Final Remedial Design: upgrading the existing cap; containment of the overburden and bedrock source areas using

hydraulic measures; treatment of the extracted groundwater on-site; collection and off-site disposal of DNAPL; and, comprehensive monitoring and additional site characterization.

- Remedial Design (RD) of the hydraulic containment system was completed in April 2004. Some of the additional groundwater wells installed during the RD serve as component parts of the hydraulic containment portion of the Final Remedy. Construction was complete in April 2005 and was tested to ensure that it is operating as designed. The construction of the cap upgrade, the final element of the remedy was completed in September 2006. Remedial action for the cap site was completed in September 2007.

Occidental Chemical – Durez

- Initial remediation of the site was completed in 1995. Based on post remedial monitoring additional contaminated sediment from the bottom of the Pettit Creek cove area was removed in May 2000. The most recent report from caged mussel bio-monitoring (~2006), indicates elevated concentrations of dioxins and furans remain in sediment. A work plan for source investigation and additional sediment removal, as needed, has been submitted by the Company and approved by NYSDEC. The purpose of the work is to determine the source of the recontamination and evaluate remedial alternatives. This work began in mid 2008 with a report due in 2009.

Dupont Plant Site, Buffalo Avenue

- The lower reach of Gill Creek (OU2), which was heavily contaminated with DuPont and Olin plant site chemicals, was partially remediated in 1982. The remaining creek remediation was completed in 1992 under a Consent Order. Pilot testing was conducted in 2002 and construction of the full scale SW Plant Ground Water Recovery System (GWRS) remedy began in 2004. The GWRS construction was completed in September 2005 and is in operation. In 2007, DuPont performed a GWRS overhaul and replacement.

- Blast fractured bedrock trenches that were installed in the SW plant area to optimize groundwater collection in that area have greatly increased hydraulic containment and pump rates. The GWRS upgrades replaced the original steam stripper and added a therm-ox unit to treat off-gasses to handle additional flow from trenches creating greater treatment reliability and reducing system down time. Approximately 133,000 pounds of organic contaminants have been removed from groundwater since startup through 1st Quarter 2008 by the GWRS and Olin pumping systems.

Vanadium Corporation

- A Record of Decision compiling the results of operable units OU#1, OU#2, and OU#3 was issued in March 2006.
- Remedial actions were completed at OU#1 and OU#2 in 2007.
- The Remedial Design for the last remaining operable unit, OU #3, will address remaining surficial waste and slag and is expected to be completed by the summer 2008. The remedial action for OU#3 should begin in late 2008. **Estimated Completion Date: October 2010**

Buffalo Color Corporation Site

- In March 2005 Honeywell (a potentially responsible party) entered into an Order on Consent to address groundwater contamination at the site by designing and installing a groundwater collection system. Design was completed in 2005. The construction was completed in 2007.

- Honeywell performed a bulk chemical removal at the Site starting in December 2005 and it is presently complete. The site though is not considered RCRA clean. The site has been transferred from NYSDEC's RCRA unit to the Division of Environmental Remediation.

- Honeywell has completed their RI/FS for Areas A,B,C and E. as part of the June 30, 2006 Consent Order. The fieldwork began in January 2007 with a draft report Remedial Investigation Report submitted in September 2007. The draft RI/FS was submitted in March 2008 and revised in August 2008. The design for the RA will begin once the RI/FS has been approved. The RA is not yet scheduled pending approval of the RI/FS, however, demolition of plant structures is expected to commence in 2009. **Estimated Start of RA: Late 2008/2009**

Bethlehem Steel Corporation (BSC) Site

- BSC has completed the field work for the site investigation, and has prepared Resource Conservation and Recovery Act Facility Investigation (RFI) and human health risk assessment reports. These had been delayed due to negotiations over the scope and the need to collect additional data, but were finally submitted in December 2004.BSC completed limited remedial technology studies for two areas that appear to be the primary sources of groundwater contamination at the facility (the Acid Tar Pits and Coke Oven Areas). The EPA and NYSDEC found the studies to be technically flawed and of limited value. BSC continues to study various potential remedial technologies.

- In 2004 DEC approved an interim corrective measures plan for the remediation of the Benzol Plant Area (i.e., the Coke Oven Area). In November 2004, NYSDEC issued a consent order to administer this project. Recovery-well installation was completed in December 2004. The system, which began operating in April 2005, includes LNAPL recover and groundwater collection and treatment.

- In 2005, Tecumseh Redevelopment Inc., a subsidiary of ISG and Mittal Steel, submitted brownfield applications to NYSDEC for two more parcels containing about 300 acres. Since any future CMS or CMI activities will require a new order, permit or other agreement, NYSDEC is currently negotiating a corrective action order with ISG for this work. Numerous areas of the site that are not regulated under the RCRA program have been proposed for clean-up under NYS Brownfield program.

  In one of these areas, eight windmills were constructed at the site under the Brownfield Cleanup Program in 2007. DEC is negotiating a Corrective Measures Study (CMS) Order

with Tecumseh Redevelopment (current owner). **Estimated Start of RA: Late 2008/2009 (Dates vary by specific RA project)**

Frontier Chemical, Royal Avenue

- In January 2001 the site was referred for RI/FS action under the NY State Superfund program. The Focused Remedial Investigation was begun in 2001. The RI/FS for the soils and upper bedrock (OU#1) was completed in early 2004. A Record of Decision (ROD) for site soils and upper bedrock groundwater (Operable Unit (OU) #1) was issued in March 2006. It requires the excavation and off-site treatment/disposal of contaminated soil source areas with control/treatment of overburden and upper bedrock groundwater. A Consent Order for the investigation and evaluation of the deeper bedrock groundwater (OU #2) and further investigation of subsurface soils to delineate on-site contamination was signed on August 15, 2008. A RI/FS for OU #2 is complete and pre-design sampling activities are underway. Subsequent design, construction and operation of the remedy will either be done by the PRPs under an Order, or by the NYSDEC using the State Superfund program. **Estimated Start of RA: Late 2008/2009**

Mobil Oil

- Exxon/Mobil has entered the Brownfield Cleanup Program to complete subsequent remediation activities under a BCP Agreement with NYSDEC dated April 3, 2006. In spring 2006 a Conceptual Site Plan (CSP) was approved by the State. The Site has been divided into nine geographic areas for the purpose of assessing environmental conditions and reporting the results of area-specific activities according to the nature of their historical primary operations. Now that sitewide remedial investigation is complete, the site was divided into five OUs based upon the anticipated phasing of subsequent remedial actions considering environmental media to be addressed, potential remedial approach and geographic areas. The remaining OUs are:

OU#2: Soil, groundwater and any free product located to the north of Prenatt St. and south of Elk St.
OU#3: Main Free Product Plume and contaminated soil and groundwater south of Prenatt Street.
OU#4: Soil and groundwater within the Eastern Tank Yard Area (ETYA).
OU#5: Buffalo River sediment impacted by Exxon/Mobil historical operations

In Spring 2006 the State executed a Brownfield Cleanup Agreement and approved a Conceptual Site Plan addressing the various operable units of the plant site. OU #1, which addressed the soil impacts in the Elk Street Properties Area determined to be attributable to the former Tank 60 release from 1976, was completed in 2007.
Estimated Completion Date: December 2011

Estimated Remediation Costs

Estimates of the cost of remediation are available for most of the 26 priority hazardous waste sites. Where available, individual project costs for each site are provided for quick reference in summary tables located in Appendix A of this report. As indicated below, the total costs incurred to date are estimated to be at least $442,869,000. Total future additional remedial and O&M costs are estimated to reach at least $262,150,000.

Based on available estimates for 21 sites, following is the total amount incurred to date (costs for the remaining 5 sites are unavailable):

Federal	$ 39.815 million
State	$ 7.425 million
PRPs	$ 395.629 million
Total	$ 442.869 million

Based on available estimates for 12 sites, the total additional remedial and O&M costs expected in the future are as follows (costs for the remaining 14 sites are unavailable):

Federal	$ 1.875 million
State	$ 0.710 million
PRPs	$ 259.564 million
Total	$ 262.149 million

The estimated costs to date cannot be compared to the estimated costs expected in the future, because different sites are included in the estimates. It is also difficult to compare the relative contributions of federal, state, and PRP expenditures, because cost information for some sites was incomplete (e.g., some sites may have been able to provide federal or state costs but not PRP costs, and so on). However, the cost information does provide a sense of the magnitude of U.S. expenditures for hazardous waste site remediation in the Niagara River basin.

Future Challenges and Opportunities for the NRTMP

A number of related initiatives are underway that present opportunities for possible merging or coordination with other activities and resources. These current initiatives include coordination of the NRTMP with the Niagara and Buffalo River AoC RAP process; future monitoring, data collection and analysis; and remediation of additional pollutant sources.

Area of Concern (AoC) RAP and Delistings – The AoC delisting initiative is a top priority for the Four Parties over the next several years. The Beneficial Use Impairments (BUIs) listed by both the binational Niagara River AoC and Buffalo River AoC are believed to be based on impacts of toxics chemicals which have been closely linked to the hazardous waste site inputs to the rivers. Formal coordination of the NRTMP and AoC RAP mechanism would achieve greater resource efficiency and public understandings.

***Niagara River Area of Concern Remedial Action Plan*:** The Niagara River Area of Concern (AoC), located in Erie and Niagara counties, extends from Smokes Creek near the southern end of the

Buffalo Harbor and north to the mouth of the Niagara River at Lake Ontario. In 1994, the NYSDEC, through an appointed Niagara River Action Committee (RAC), completed and published a Remedial Action Plan (RAP). To date, the RAC has identified 5 BUIs to be addressed and 2 likely BUIs needing further assessment (see Table 3). Past municipal and industrial discharges and hazardous waste disposal sites have been a source of contaminants to the Niagara River which have been linked to several BUIs in the AoC. Of the 26 priority waste sites discussed in this report, 21 sites are located directly in the Niagara River watershed basin. Of these 21 sites, nineteen sites have completed remedial construction and two sites (Frontier Chemical Royal Ave. and Vanadium Corporation) have remedial actions currently underway. It is understood by the Four Parties that the NRTMP initiative contributes greatly towards the restoration of wildlife and aquatic habitats, re-designation of beneficial uses from impaired to un-impaired, and the ultimate de-listing of the Niagara River AoC. Therefore, it is noted by the joint agencies as an example of bi-national cooperation on the Niagara River and as an important contribution to the RAP process in the AoC. It is expected that RAP implementation will progress at an aggressive pace over the next several years while the NRTMP works towards removing all remaining toxic pollutant inputs to the river. In May 2008, EPA set a target for all Niagara River AoC BUI re-designations by 2014 through award of a $1.4 million grant to the NYSDEC for the St. Lawrence/Niagara River bi-national AoC delisting initiative.

***Buffalo River Area of Concern Remedial Action Plan*:** The Buffalo River AoC is located in the City of Buffalo in Western New York State. The river flows from the east and discharges into Lake Erie near the head waters of the Niagara River. In 1989, a RAP was prepared by the NYSDEC for the Buffalo River AoC. The NYSDEC acted as RAP coordinator from 1989 – 2005 until the U.S. EPA Great lakes National Program Office selected the Buffalo Niagara Riverkeeper (BNR) as RAP implementation coordinators. To date, the BNR has identified 6 BUIs to be addressed, 3 likely BUIs needing further assessment, and 2 BUIs of unknown status (see Table 4). Of the 26 priority waste sites discussed in this report, one site (Bethlehem Steel Corporation Site) has direct local impacts to Buffalo Harbor to the north and on the western boundary of Lake Erie and four sites (Buffalo Color Corporation Site, Buffalo Color – Area D, Mobil Oil, and Iroquois Gas-Westwood Pharmaceutical) have direct local impacts to the Buffalo River. These five sites are part of the NRTMP 26 priority sites since they in turn have impacts to the head waters of the Niagara River (see Figure 1). Two of the sites (Buffalo Color–Area D and Iroquois Gas-Westwood Pharmaceuticals) have completed remedial construction and two sites (Mobil Oil and Buffalo Color Corporation Site) have remedial actions currently underway. The other site (Bethlehem Steel) has remedial action underway. These NRTMP waste sites are listed as part of the Buffalo River RAP to be addressed towards restoring beneficial uses. Restoration and re-designation of the BUIs in Lake Erie, Buffalo and Niagara Rivers will ultimately result in de-listing of the Buffalo River AoC as well as the Niagara River AoC.

TABLE 3 **TABLE 4**

Niagara River AoC Beneficial Use Impairments

Of the 14 beneficial uses, five are impaired for the Niagara River:

1. Restrictions on fish and wildlife consumption
2. Fish tumors or other deformities
3. Degradation of Benthos
4. Restriction on dredging activities
5. Loss of fish and wildlife habitat

In addition, the designation of two beneficial uses need further assessment to determine their status:

1. Degradation of fish and wildlife populations
2. Bird or animal deformities or reproductive problems

Buffalo River AoC Beneficial Use Impairments

Of the 14 beneficial uses, six are impaired for the Buffalo River:

1. Restrictions on fish and wildlife consumption
2. Fish tumors or other deformities
3. Degradation of aesthetics
4. Degradation of Benthos
5. Restriction on dredging activities
6. Loss of fish and wildlife habitat

In addition, the designation of five beneficial uses need further assessment to determine their status:

1. Eutrophication or undesirable algae
2. Tainting of fish and wildlife flavor
3. Degradation of fish and wildlife populations
4. Bird or animal deformities or reproductive problems
5. Degradation of phytoplankton and zooplankton populations

Future Monitoring, Data Collection and Analysis – In addition to the effectiveness of pollutant removal at the waste sites themselves, it is important to note that there are three components to the NRTMP monitoring plan: Environment Canada (EC) Upstream/Downstream (U/D Program); Bio-monitoring (mussels, young-of-year fish, wildlife); and source track down & analysis screening. Anticipated in 2009, the Niagara River Secretariat will prepare a trend analysis report covering the past 20 years of data collected in-water and compare concentration inputs at Fort Erie and Niagara-on-the-Lake. The U/D Program is expected to continue to be a valuable tool for assessing overall progress and future priorities as explained below in more detail.

NRTMP Monitoring Program Plan: The NRTMP's primary mechanism for measuring improvements in water quality is the Environment Canada (EC) U/D Program. The U/D Program measures approximately 50 organic chemicals and includes the 18 NRTMP Priority Toxics in the dissolved and particulate phases at the head (Fort Erie) and the mouth (Niagara-on-the-Lake) of the Niagara River where it enters Lake Ontario (Figure 2). Water quality data is collected year-around and EC publishes a formal U/D Program report on every ~2 years of data. The most recent U/D Program report was published in 2007 and includes data from 2004/2005. Since 1987, high quality US and Canadian government monitoring program information provide clear evidence of reductions for most of the 18 Niagara River Priority Toxics in water, sediment and biological indicators in the range of 50% or greater by the 1996 target year. The Niagara River Secretariat 20-year data trend report is expected to be a useful tool for setting priorities such as future track down and analysis studies to identify potential new sources of contaminants, new emerging chemicals, and NRTMP management strategies for reducing these chemicals.

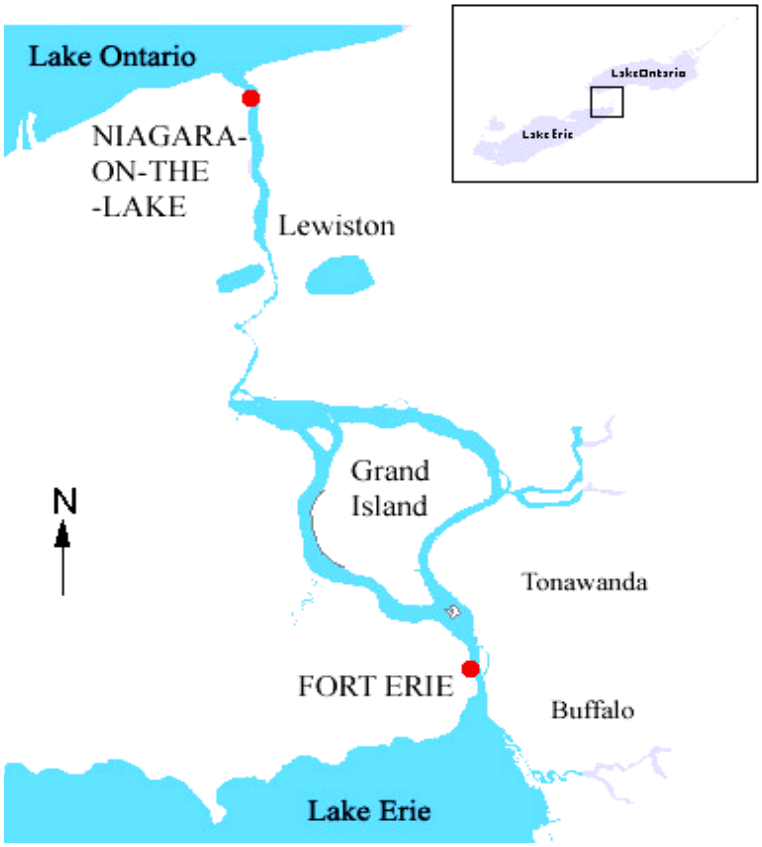

Figure 2. Environment Canada's Niagara River Upstream/Downstream Surface Water Sampling Locations

Remediation of Additional Pollutant Sources – The 1989 EPA/NYSDEC Hazardous Waste Site Report identified the NRTMP's original 26 waste sites as highest priorities due to their potential to contribute over 90% of the total toxic chemical loadings to the Niagara River. These 26 sites and the estimated loadings were based on earlier studies and often on preliminary data. Although these 26 sites were of top priority for the NRTMP, numerous investigations and remediations at other site areas, some consisting of multiple individual sites, were being addressed under New York State's remedial programs. The additional efforts by NYSDEC and EPA have included six additional sites described below now known to be significant contributors of toxic contamination to the river but for which insufficient data existed in 1989 to include them in the NRTMP. The NRTMP is considering the need for a revised assessment of the toxic contamination contributions from all known hazardous waste sites to the river using current methods and techniques. For a quick reference, see the summary tables for these projects located in Appendix B of this report. Also, detailed site information for all sites can be found in NYSDEC's Environmental Site Remediation Database website located at… http://www.dec.ny.gov/cfmx/extapps/derfoil/index.cfm?pageid=3 .

Fourth Street Site – NYSDEC #915167

The site is located on Fourth and Village Court streets in the City of Buffalo and is located in a mixed residential, commercial, and recreational setting approximately 1500 feet from the Lake Erie shoreline. The Citizens Gas Works operated on this property staring from the early 1900's. From 1934 to 1958, a portion of the property was also used by Greyhound Bus Company to service its vehicles. During a site evaluation in 1992 black tar material was found in one area of the property. Soil/tar and groundwater samples were tested during the investigation and results showed contained up to 3300 ppm of benzene, 3000 ppm of toluene, 2700 ppm of xylenes, 3000 ppm phenolic compounds, and 53,000 ppm of PAHs. Site groundwater exceeded groundwater standards for benzene, toluene, xylenes, PAHs, and phenolic compounds. In August 1996, NYSDEC/NYSDOH did additional testing which detected surface soil samples containing up to 420 ppm of PAHs. The tar material was found to be a hazardous waste as it failed TCLP for benzene. The City of Buffalo conducted an investigation and submitted the Remedial Investigation/Feasibility Study (RI/FS) report in January 2001. A Record of Decision (ROD) was issued in 2001 requiring the removal of all contaminated tar materials from the site. The construction of the remedy began in July 2005 and was completed in early 2006. Now that remediation is complete, an environmental easement will be implemented for the site and then the site will be reclassified and will enter the site management phase.

Former Buffalo Service Center – NYSDEC #C915194

This site is the location of a former Manufactured Gas Plant (MGP) which was operated by various companies from 1848 to 1948. The site was initially investigated by the owner - National Fuel Gas during the period 1989 to 2004. The investigation confirmed the presence of MGP wastes (containing benzene, toluene, ethylbenzene, xylenes, polycyclic aromatic hydrocarbons, total cyanides) in soil and groundwater at the site. In June 2005 a volunteer applied to the Brownfield Cleanup Program to remediate the site in preparation for building an office building. The site remediation consisted of excavation and off-site disposal of contaminated soils above the predetermined cleanup levels and backfilling with clean soil/material. Work began in summer 2005 and was completed in early 2006. An environmental easement requiring a Site Management Plan was filed on September 7, 2006 in the Erie County Clerk's office. Remaining groundwater contamination will be monitored by an Operation & Monitoring Plan. A Certificate of Completion was issued on November 30, 2006. The cleanup has resulted in the construction of an approximately 350,000 square foot Health Now building by Duke Realty at the remediated site. Groundwater at the site is being monitored in accordance with the Site Management Plan, dated October 2, 2006.

Alltift Landfill – NYSDEC #915054

This site is a former landfill that was previously used for the disposal of domestic and industrial wastes. Environmental studies documented surface and groundwater contamination. According to Phase II Investigation documentation, Allied Corp. (National Aniline Division) disposed miscellaneous organic chemicals, chrome sludge, copper sulfate, nitrobenzene, monochlorobenzene, and naphthalene on a monthly basis in the landfill. A smaller landfill containing automobile shredder wastes, demolition debris, fly-ash and sand wastes was situated on top of the older chemical waste landfill. This smaller landfill was operated between 1975 and 1984. A Consent Order for the completion of a RI/FS of the site was signed by Allied Signal in 1991.

An RI report was submitted in 1992 finding that groundwater and the ponds adjacent to the site were impacted by the landfill. Contaminants of concern include metals, pesticides, PCBs, chlorinated solvents and PAHs and would be tributary to the Buffalo River drainage basin.

A Record of Decision (ROD) was signed on March 27, 1995 requiring: capping, waste consolidation, wetlands restoration, and groundwater collection. Remedial action began in 2004 and was completed in 2005. An operation, maintenance and monitoring plan was put in place in 2006.

Steelfields Site – NYSDEC #V00619

The Steelfields Site is located in the City of Buffalo adjacent to the Buffalo River. The site is comprised of four distinct areas based on the historical operations that occurred there. These areas are known as: Area I-Republic Steel Area, Area II-Donner-Hanna Coke Plant, Area III- Republic Steel Warehouse, and the Area IV-Coke Storage Yard. The former above-ground facilities were demolished previously by the LTV Steel Company. Today the site is largely vacant except for the former "August Feine" building located just north of Area II where a newly constructed containment cell exists. In 2006, Area IV was separated from the site and entered into the Brownfield Cleanup Program as Steelfields Area IV Site#C915204. Area IV is also listed on the NYS Registry as a Class 3 hazardous waste site under Site #915017. The Steelfields site was the location of a former steel and coke-making facility. The site had significant amount of fill material (2 to 20 feet in depth) from past activities. The fill consisted of waste slag and coke, in addition to significant quantities of chemically contaminated soils from past disposal practices on the site. LTV Steel, the previous Volunteer for this site (V00133) went bankrupt in 2000. In October 2002 Steelfields Ltd. purchased the site out of bankruptcy. Steelfields Ltd. entered into the Voluntary Cleanup Program and agreed to undertake the necessary investigation and cleanup of the 218 acres. A work plan outlining the work to be performed was approved in 2002. Remedial work was completed on approximately 90 acres known as Area 1 in 2004. Remedial work was completed in all areas of the site by October 2007.

Niacet Corporation – NYSDEC # V00373

The Niacet facility, formally a Union Carbide Corporation facility, is located on 19.42 acres at the intersection of 47th St and Pine Ave in the City of Niagara Falls. The facility is an active manufacturing facility first constructed in 1925 and operated as the Niacet Chemical Company. The plant originally produced acetaldehyde, paraldehyde, aldol and crotonaldehyde. The production of acetic acid was begun in 1928 and the manufacture of sodium acetate and other acetates began in 1935. Vinyl acetate production was added in 1937. In 1957 the facility name was changed to Union Carbide Corporation. The plant produced a variety of wastes including mercury/aluminum sludge, 2-ethylexoate, zincacetate, acetic acid, acetate salts and overflows from the vinyl division. In 1978 Niacet purchased the property from Union Carbide Corporation and currently manufactures specialty chemical products for food, pharmaceutical and industrial applications. A site investigation was completed in 2002 indicating the presence of mercury contaminated soil. A supplemental site investigation was completed in March 2006. A draft Remedial Action Selection Report (RAS) was submitted in November 2006. The draft RAS was not acceptable and Department requested revisions to the RAS were requested. Resubmission of the RAS is pending.

Spaulding Fiber Site – NYSDEC #915050/E915050

The 46 acre Spaulding Composites Site is located at 310 Wheeler Street in the City of Tonawanda. Spaulding manufactured composite laminates and vulcanized fiber between 1911 and 1992 at this now abandoned facility. The paper used to produce vulcanized fiber, and many of the phenolic resins used in the production of the composite laminates, were also manufactured on site. Site drainage and contaminant transport was tributary to the Niagara River through the municipal storm sewer system. All RI/FS/Corrective Measure Studies have been completed for RCRA/Superfund portions of the site. The Record of Decision (ROD) for this site was issued in March 2003. Seventeen Solid Waste Management Units (SWMUs)within approximately 2.5 acres of property around the plant buildings were identified (included in four separate operable units) as requiring remediation as a part of the SSF project; the rest of the property is being addressed as part of an Environmental Remediation Project(ERP). Remediation of OU#2 was performed as an IRM to address PCB contamination of surface and subsurface soils. Remediation of the three remaining OUs (OU#1, OU#3, OU#4) will be undertaken utilizing the State Superfund. The Pre-Design Investigation Report was finalized in January 2008; the design is anticipated to be completed by the late summer 2008, with remedial construction to follow in 2009. The RI/FS for the ERP portion of the site is underway and a ROD for the project is expected in early 2009.

Acronyms

APL	Aqueous phase liquids
BCC	Buffalo Chemical Corporation
BSC	Bethlehem Steel Corporation
UI	Beneficial Use Impairment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CMI	Corrective Measure Implementation
CMS	Corrective Measure Study
DDT	primarily 1,1'-(2,2,2-trichloroethylidene)-bis/4 chlorobenzene
DEC	New York State Department of Environmental Conservation
DNAPL	Dense non-aqueous phase liquids
DWTP	Drinking Water Treatment Plant
EC	Environment Canada
EPA	U.S. Environmental Protection Agency
HSWA	Hazardous and Solid Waste Amendments
ICM	Interim Corrective Measure
IIWA	Immediately Implementable Work Assignment
IRM	Interim Remedial Measure
MOE	Ontario Ministry of the Environment
NAPL	Non-aqueous phase liquids
NRTMP	Niagara River Toxics Management Plan
OCC	Occidental Chemical Corporation
OU	Operable Unit
PCBs	Polychlorinated biphenyls
PRP	Potentially Responsible Party
PSA	Preliminary Site Assessment
PVC	Polyvinyl chloride
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RFP	Request for Proposal
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RRT	Requisite Remedial Technology
SPDES	New York State Pollutant Discharge Elimination System
TCDD	Tetrachlorodibenzo-p-dioxin
TBD	To Be Determined
TCP	Trichlorophenol
VOC	Volatile organic compounds

Glossary

A

Ambient
A surrounding medium, such as water or air. Used in contrast to a specific source.

Aquatic
Growing in, living in, or dependent upon water.

Atmospheric deposition
Pollution from the atmosphere associated with dry deposition in the form of dust, wet deposition in the form of rain and snow, or as a result of vapor exchanges.

B

Barrier wall
A wall constructed underground in a hazardous waste site or landfill to stop the flow of contaminated groundwater.

Basin
The land that drains into a waterbody.

Bedrock groundwater
Water flowing through a rock layer underground, under a top layer of mixed soil and loose rock called the overburden.

Benzo(a)pyrene [B(a)P]
A PAH that is formed by the incomplete combustion of fossil fuels, wood, and tobacco; the incineration of garbage; and in steel production.

Bioaccumulation
The process by which chemical substances accumulate in the tissues of an organism that drinks contaminated water or eats contaminated food.

C

Cap
A cover over hazardous waste sites, usually made of clean soils or clay, that prevents rainwater from seeping through soil and causing the contaminants in the soil to flow into the groundwater.

Capture Zone
Area in which groundwater is flowing towards a pumping well; used as remediation technique for hazardous waste sites, to "capture" contaminated groundwater and treat it.

Chlordane
A persistent toxic chemical that was used to control ants, grasshoppers, and other insects on certain crops.

Collection drain
System of pipes around a hazardous waste site or landfill that collects surface or groundwater and directs it toward a treatment plant.

Combined sewer overflow (CSO)
Water discharged into a waterbody from a sewer system that carries both sanitary sewage and stormwater runoff. During dry weather the combined sewer system's flow is normally treated at a wastewater treatment plant, but during rain events, the plant's capacity may be exceeded and the flow may be bypassed to discharge, untreated, directly into a waterbody.

Consent decree
A legal document, approved by a judge, which puts into effect a remedy (i.e., actions to correct an environmental problem).

Contaminant
A substance that is not naturally present in the environment or is present in amounts that can adversely affect the environment.

D

Dredging
Removal of sediment from the bottom of a waterbody.

DDT
Dichloro-diphynyl-trichloroethane. A persistent toxic chemical that was used as a pesticide, particularly for mosquito control. DDT is banned in U.S. and Canada. DDE and DDD are metabolites of DDT.

Dieldrin
A persistent toxic chemical that was used mainly as a soil insecticide.

Dioxins/furans
Dioxin: A family of persistent toxic chemicals known as dibenzo-p-dioxins. Dioxins can enter the environment as the by-products of industrial processes or as a result of combustion processes in incinerators and motor vehicles using leaded fuel. The compound called "2,3,7,8-TCDD" is the most toxic member of the dioxin family.
Furans are a class of chemicals similar to dioxins, which are created at high temperatures, such as incineration of PCBs and other organic wastes containing chlorine.

DNAPL (Dense Non-Aqueous Phase Liquid)
An oily, sludge-like mixture of chemicals that is denser than water. DNAPL flows with gravity or along geological formations, not always in the same direction as groundwater.

Downstream
In the direction with the flow of a stream or river; down river. For Niagara River, downstream is towards Niagara-on-the-Lake and Lake Ontario.

E

Embayment
A bay. A part of a waterbody (such as a river or lake) that makes an indentation into the adjacent land.

F

Force main
A pipe that carries contaminated groundwater drawn out of hazardous waste sites by pumping wells to a treatment plant.

Four Parties
The four agencies who implement the Niagara River Toxics Management Plan: U.S. Environmental Protection Agency, Environment Canada, New York State Department of Environmental Protection, and Ontario Ministry of Environment and Energy.

G

Groundwater
The fresh or saline waters found beneath the Earth's surface that often supply wells and springs. Contrast to "Surface water".

H

Habitat
Place where a particular type of plant or animal lives. An organism's habitat must provide all of the basic requirements for its life.

Hazardous waste

Any substance that is a by-product of society and is classified under U.S. or Canadian law as potentially harmful to human health or the environment. Hazardous wastes are subject to special handling, shipping, storage, and disposal requirements under the law.

Hazardous waste site
Land disposal site for hazardous wastes.

Heavy metals
Metallic elements with high atomic weights that tend to be toxic and bioaccumulate. Examples are mercury, arsenic, lead, etc.

Hexachlorobenzene (HCB)
A persistent toxic chemical that was originally manufactured as a fungicide for cereal crops. It is also generated as a by-product in the manufacture of pesticides and can be formed during the combustion of substances containing chlorine.

I

Infiltration
Passing through or filtering through, as in rain water that filters through soil to join groundwater.

Inorganic substance
A chemical compound that does not contain carbon. Inorganic substances are often derived from minerals.

Insecticide
A chemical used to kill or control the growth of insects.

L

Landfill
Land disposal site for hazardous (or non-hazardous) wastes.

Leachate
Liquid derived from rain or snow melt that percolates through a hazardous waste site.

Load or Loading
The amount of a material entering a system over a given time interval.

M

Medium (plural: Media)
A surrounding substance in the environment: water, air, or sediment.

Metabolite
A substance that is the product of biological changes to a chemical.

Mirex
A persistent toxic substance that was used as an insecticide and a fire retardant.

Multi-media
Involving multiple media, such as water and air, or air and sediment, or all three.

N

National Priorities List (NPL)
An EPA list of the most serious uncontrolled or abandoned U.S. hazardous waste sites identified for long-term remedial action under Superfund.

Non-point source
Diffuse pollution sources (i.e., without a single point of origin or not introduced into a waterbody from a specific outlet). Generally carried off the land by stormwater. Common sources can be associated with a variety of land-uses (e.g., agriculture, forestry, and urban) and activities (e.g., construction,

mining, and land disposal).Contrast to “Point source”.

O

Organic substance
A chemical compound that contains carbon.

Overburden groundwater
Water flowing through a layer of mixed soil and loose rock that lies over the rock layer called bedrock.

P

PAHs
Polycyclic or polynuclear aromatic hydrocarbons. A class of persistent toxic compounds that are formed from the combustion of organic material, such as forest fires or gasoline in cars.

PCBs
Polychlorinated biphenyls. A group of persistent toxic chemicals used in electrical and hydraulic equipment for insulating or lubricating purposes.

Persistent toxic chemical
Any toxic chemical that is difficult to destroy or that breaks down slowly in the environment (i.e., with a half-life in water greater than eight weeks).

Pesticide
A chemical used for preventing, destroying, or repelling any pest.

Octachlorostyrene (OCS)
A persistent toxic chemical that was released as a by-product when chlorine was manufactured using certain processes that are no longer used.

Point source
Any discernible confined and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, container, landfill, leachate collection system, vessel or other floating craft from which pollutants are or may be discharged from.

Pollution prevention
Any action that reduces or eliminates pollutants before they enter the environment.

Potentially Responsible Party (PRP)
Any individual or company potentially responsible for, or contributing to, the contamination problems at U.S. hazardous waste sites.

Pretreatment
Processes used to reduce, eliminate, or alter pollutants from industrial sources before they are discharged into publicly-owned sewage treatment systems.

Priority toxic chemicals
Under the NRTMP, 18 toxic chemicals that exceeded water quality or fish tissue standards in the Niagara River or Lake Ontario.

R

RCRA
Resource Conservation and Recovery Act. A U.S. program to remediate active hazardous waste sites. Sites are remediated by potentially responsible parties whenever this can be arranged.

Record of Decision (ROD)
A public document that explains what actions will be taken to remediate a U.S. hazardous waste site.

Remedial Investigation/Feasibility Study (RI/FS)
The RI defines the areal and vertical extent of the hazardous waste problem at a Superfund site through numerous sampling wells, an extended environmental sampling program and a full geophysical survey. Based on the RI, the FS develops and evaluates alternative solutions to the problem.

Requisite Remedial Technology (RRT)
An RRT is the equivalent of an FS (see **RI/FS** above) for a pre-CERCLA agreement.

Runoff
Water that flows over the land surface into a waterbody.

S

Slurry wall
Barrier made of a thin, watery mixture of fine, insoluble material (e.g., clay, cement, soil).

Solid Waste Management Units (SWMUs)
Areas within a hazardous waste site where hazardous materials are stored or managed. SWMUs are generally storage areas, treatment systems, disposal areas, spill areas, or containment cells.

Superfund
A U.S. program to remediate inactive or abandoned hazardous waste sites in an emergency or for the long-term. Sites are remediated by potentially responsible parties whenever this can be arranged.

Surface water
All water open to the atmosphere (e.g., rivers, lakes, reservoirs, seas, etc.).Contrast to "Groundwater".

T

Toxaphene
A persistent toxic chemical that was used as an insecticide.

Toxic substance
Any substance that adversely affects the health or well-being of a living organism, e.g., causing death, disease, birth defects, behavioral abnormalities, cancer, genetic mutations, physiological/reproductive malfunctions, or physical deformities.

U

Upstream
In the direction against the flow of a stream or river; upriver. For Niagara River, upstream is towards Fort Erie and Lake Erie.

V

Volatile substance
A substance that evaporates readily.

W

Wetland
An area that is saturated with water or has a water level at or near the surface. A wetland has organic soils and plant/animal species that are adapted to a wet environment.

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APPENDIX A

PRIORITY NIAGARA RIVER HAZARDOUS WASTE SITES:

SITE REMEDIATION STATUS SUMMARIES

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APPENDIX B

REMEDIATION of ADDITIONAL POLLUTANT SOURCES:

SITE REMEDIATION STATUS SUMMARIES

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